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(54) PROCESS FOR COMBUSTION OR DECOMPOSITION OF POLLUTANTS AND EQUIPMENT THEREFOR.

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ed. After start of the apparatus 1, i.e. heating the bed to the self combustion and/or self decomposition temperature of the medium intended to be treated, the intention is to preferably let the pollutants in question be fed into it by means of conduit 2 in order to drive the apparatus 1, but mainly to ascertain a complete combustion of said pollutants which may be harmful or odorous like paint gases.

The feeding of pollutants to the device 3 for changing of flow direction is done through a duct 4 from the inlet 5.

Changing of the direction of flow by means of the device 3 by for instance an incorporated valve 6 which can be switched between two alternative positions makes the feeding of pollutants coming via the inlet 5 to the combustor in one or the other of the two directions 7 or 8 by means of ducts 9 or 10. Said duct 2 also works as outlet for air and/or gas from the combustor 1 to an exhaust duct 11 which leads from the flow direction changer 3 to an exhaust 12.

The counter current regenerative heat exchange occurring in the bed makes it possible to use the heat contents of the treated gas which leaves through the bed 1' of the combustor 1 to heat the gas and/or air or of other gas carried particulate pollutants which are being fed inwards through said bed 1'. Preferably this is done so that maximum temperature and combustion and/or decomposition occurs in the central parts of the bed 1'. This is accomplished by changing of the direction of gas flow through the combustor 1 and its bed 1' at suitable time intervals by means of the gas flow direction changer 3. Hereby it is made possible to keep the maximum of the temperature profile in the central parts of the combustor bed where said combustion and/or decomposition is desired to take place.

After start of operation of the combustor at desired self combustion and/or self decomposition temperature by using the above mentioned heating means the combustion and/or decomposition of the pollutants can often proceed by influence from the heat of the bed 1' without having any extra energy supplied by the heating means. This is the case when heat produced by the reaction in the bed is enough to compensate for unavoidable heat losses from for instance incomplete heat exchange in the bed.

In cases when the pollutants are rich in energy, produced excess heat could be utilized by extraction at desired temperature level by means of cooling tubes installed at suitable positions in the bed.

A storing device M which makes possible a safe reception of pollutants which are fed from the inlet 5 to the changing device 3 during the time said changing device 3 is being switched over for the reversal of the flow direction in the conduit 2 to the combustor 1 is connected to the outlet duct 11 after the direction changer 3, as seen in the direction of the flow. This is done to prevent pollutants to escape in connection with the above described interchange of point of feed and point of outlet of gas/air. Preferably said storing device M comprises a comparatively long duct 13 which makes it possible to temporarily store air/gas of said kind. A circuit 14 which comprises an entrance duct 15 which is connected to the exhaust duct 11 before an incorporated valve 16 or

the like and an outlet 17 which is connected to the inlet duct 4 is connected to said long duct 13 or the like in store M incorporated reception reservoir. One way valves 18 and 19 which make it possible to convey air and/or gas in the direction of the arrows 20 and 21 on the drawing to and from the store M, but are designed to automatically shut off flow in the opposite direction, are incorporated in the inlet and outlet ducts 15 and 17, respectively. A valve 22 is incorporated in a duct 23 leading for instance outside from the store M and a fan 24 or some other type of blowing machinery is connected to the store M. This fan can preferably be run continuously while the device is operating. Changing of flow is made possible according to the following: Positions of the valve 6 at the switching device 3 according to the continuous line in the drawing will convey the pollutants in the direction 7 in the conduit 2 into the combustor 1 and convey treated gas to the outlet 12 from the combustor 1 in the direction 25. Reversal of the valve 6 according to the dashed line on the drawing will convey the pollutants from the entrance 5 to the combustor 1 in the direction 8 and thus treated gas by means of the circuit 9 to the exhaust 12 in the direction 26. When opening valve 22 the one way valve 19 is automatically shut so that possible gas flowing towards exhaust 12 is instead conveyed into the store M when valve 16 has been shut off and the one way valve 18 opened. This is done when changing the direction of gas flow by means of the device 3 and the circuits are blown through for a certain time after the change of direction to make pollutants not desired to escape instead go into the store M. Thereafter the valve 16 is opened whereby one way valve 18 is automatically shut off and valve 22 is closed so that one way valve 19 automatically opens. Air/gas stored in M is then fed to the inlet duct 4 and to the combustor 1 in the above mentioned way by means of the fan 24 in the direction of arrow 21. The store M thus makes possible an effective storage of harmful air/gas which otherwise could have escaped during the changing of direction of flow.

The invention is not limited to the embodiment described above and shown on the drawing, but can be varied within the limits of the claims without differing from the scope of the invention.

Claims

1. A process for the establishment of combustion and/or decomposition of pollutants in the form of gas, droplets or other particles carried by air or other gas, characterized by said pollutants being fed into an apparatus in which the pollutants are heated in a fixed bed to self combustion and/or self decomposition temperature mainly without external energy supply after a starting up stage, by means of regenerative counter current heat exchange, the fixed bed being heated by the hot treated gas resulting from combustion and/or decomposition of said pollutants and flowing through the fixed bed in direction towards the exhaust part of the combustion device.
2. A process according to claim 1, characterized by changing the direction of gas flow through the

fixed bed of the combustion apparatus at suitable time intervals by means of a gas flow direction changing device which is connected to the combustion device.

3. A process according to anyone of the preceding claims, characterized by directing the pollutants through a fixed bed consisting of sand, stone or other material having heat accumulating and heat exchanging properties, said fixed bed being positioned within the combustion apparatus in order to combust and/or decompose said pollutants.

4. A process according to claim 3, characterized by heating the central portion of the fixed bed up to decomposition and/or combustion temperature, at least from the starting point, by means of an electric heater positioned within the bed or by means of oil, gas etc.

5. A process according to anyone of the preceding claims, characterized by safely passing the gas stream coming from said device for changing direction of flow into a store in connection with the changing of the direction of the flow, from which store the gas is later fed into the combustion apparatus.

6. A process according to claim 5, characterized by cutting off the outlet communication between the flow direction changing device and the outlet by means of a valve and thereby opening a one way valve positioned within a duct which is connected to the storing device.

7. A process according to claim 6, characterized by opening an inlet duct leading from the environment to the storing device by means of a valve and thereby closing a one way valve positioned within an outlet duct leading from the storing device and being in communication with an inlet duct extending between the inlet and the changing device.

8. A process according to anyone of claims 1-7, characterized by extracting surplus heat by means of cooling tubes positioned in the fixed bed.

9. An apparatus for combustion and/or decomposition of pollutants in the form of gas, droplets or other particles carried by air or other gas according to anyone of the preceding claims, characterized by a combustor (1) comprising a fixed bed (1') of sand, stone or other material having heat accumulating and heat exchanging properties and means for heating of a central portion of said bed up to self decomposition and/or self combustion temperature of the medium intended to be treated, for instance by means of an electric heater positioned within the bed or by means of gas or oil and said combustor being of so called regenerative kind being able to receive a flow of said pollutants alternatively in different directions.

10. An apparatus according to claim 9, characterized by a device (3) for changing the gas flow direction which is connected to the combustor (1) via a communication (2) alternatively connectable to an inlet (5) and an outlet (12) respectively in order to feed polluted gas into the combustor (1) and extract treated gas from the combustor (1).

11. An apparatus according to claim 10, characterized by having storing means (M) for temporary receipt of gas flowing from the device (3) for changing the flow direction during and shortly after the changing of flow direction, said storing means

preferably incorporating an extended communication then returning uncompletely treated gas to the inlet side of the combustor.

12. An apparatus according to anyone of claims 9-11, characterized by having cooling tubes positioned within said fixed (1') bed in order to make use of surplus heat.

10 Patentansprüche

1. Verfahren zur Bewerkstelligung einer Verbrennung und/oder Zersetzung von Schadstoffen in Form von Gas, Tröpfchen oder anderen Partikeln, die von einem anderen Gas transportiert werden, dadurch gekennzeichnet, dass die Schadstoffe in eine Vorrichtung eingeführt werden, in der die Schadstoffe in einem Festbett auf eine Selbstverbrennungs- und / oder Stelbzersetzungstemperatur in der Hauptsache ohne eine externe Energiezufuhr nach einer Anfahrstufe mittels eines regenerativen Gegenstrom-Wärmetauschs erhitzt werden, wobei das Festbett durch das heiße, behandelte, aus einer Verbrennung und/oder Zersetzung der Schadstoffe resultierende und durch das Festbett in einer Richtung zum Abgassteil der Verbrennungsvorrichtung hin strömende Gas erhitzt wird.

2. Verfahren nach Anspruch 1, gekennzeichnet durch Änderung der Gasströmungsrichtung durch das Festbett der Verbrennungsvorrichtung in angemessenen Zeitabständen mittels einer mit der Verbrennungsvorrichtung verbundenen Gassströmungsrichtung-Änderungsvorrichtung.

3. Verfahren nach einem der vorhergehenden Ansprüche, gekennzeichnet durch Leiten der Schadstoffe durch ein aus Sand, Stein oder einem anderen Material mit wärmespeichernden und wärmetauschenden Eigenschaften bestehendes Festbett, das sich innerhalb der Verbrennungsvorrichtung befindet, um die Schadstoffe zu verbrennen und/oder zu zersetzen.

4. Verfahren nach Anspruch 3, gekennzeichnet durch Erhitzen des zentralen Teils des Festbetts auf eine Verbrennungs- und/oder Zersetzungstemperatur wenigstens vom Anfahrzeitpunkt aus mittels einer elektrischen, innerhalb des Betts angeordneten Heizvorrichtung oder mittels Öl, Gas und so weiter.

5. Verfahren nach einem der vorhergehenden Ansprüche, gekennzeichnet durch Führen des von der Vorrichtung zur Änderung der Strömungsrichtung kommenden Gasstromes in gesicherter Weise in einen mit der Strömungsrichtung-Änderungsvorrichtung verbundenen Speicher, von welchem das Gas später in die Verbrennungsvorrichtung geführt wird.

6. Verfahren nach Anspruch 5, gekennzeichnet durch Absperren der Auslassverbindung zwischen der Strömungsrichtung-Änderungsvorrichtung und dem Austritt mittels eines Absperrorgans und Öffnen auf diese Weise eines innerhalb einer mit der Speichervorrichtung verbundenen Leitung liegenden Rückschlagventils.

7. Verfahren nach Anspruch 6, gekennzeichnet durch Öffnen einer von der Umgebung zur Speichervorrichtung führenden Einlaßleitung mittels eines Absperrorgans und Schließen auf diese Weise ei-

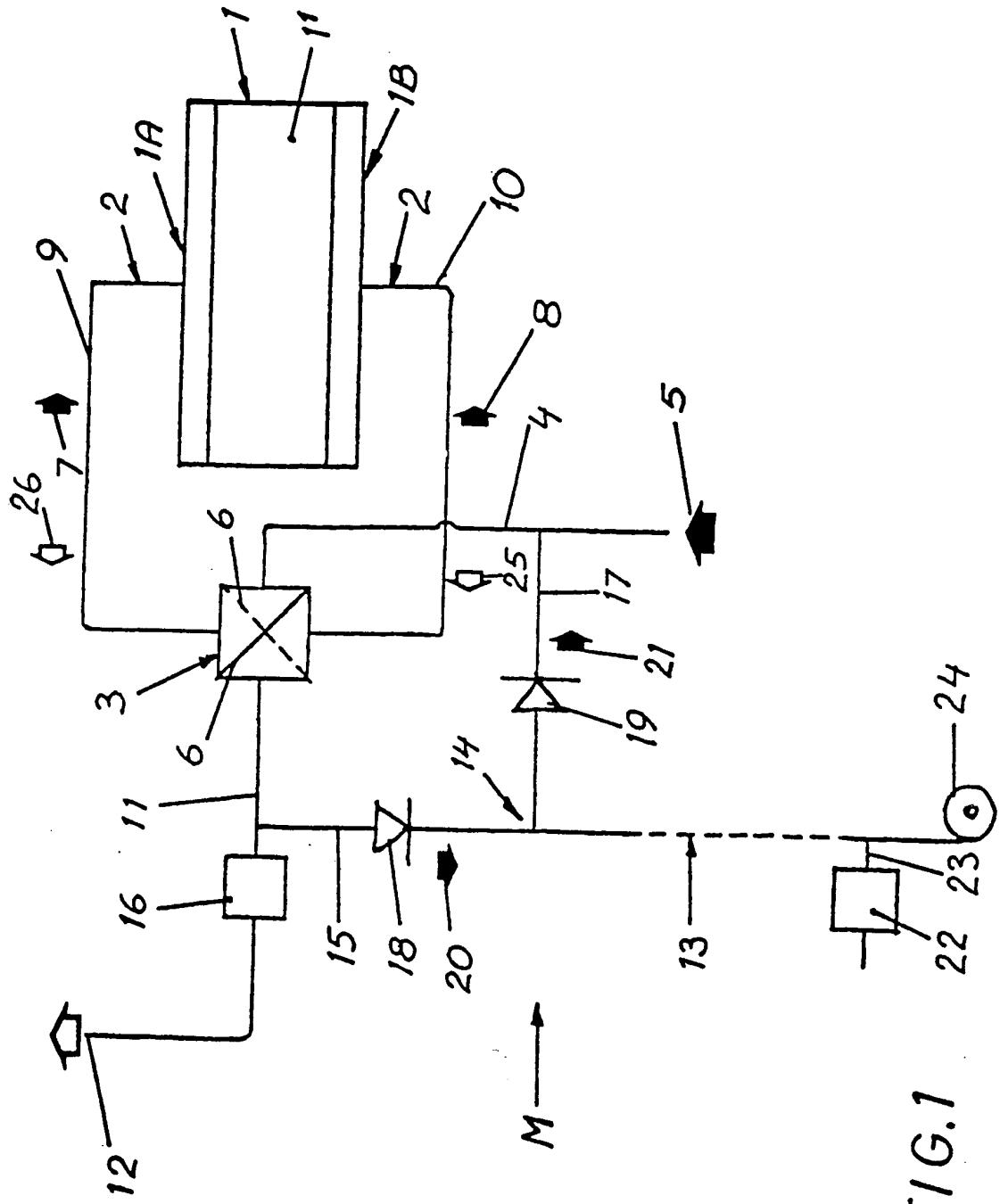


FIG.1